

REMARKS

A Request for Continued Examination is attached, along with a Petition for Revival of an Application for Patent Abandoned Unintentionally herewith.

Claims 1-19 are all the claims presently pending in the application. Claims 1, 9, and 18 are amended to more clearly define the invention. Claims 1, 9, and 18 are independent.

Applicants thank Examiner Tamai for the courtesies extended to the Applicants' representative during the personal interview on March 2, 2004. During the personal interview, the Applicants' representative explained that none of the applied references teaches or suggests the features of the claimed invention including an actual work time that is based upon a magnetic bearing drive signal.

These amendments are made only to more particularly point out the invention for the Examiner and not for narrowing the scope of the claims or for any reason related to a statutory requirement for patentability.

Support for the amendments to claims 1, 9, and 18 may be found in the specification at, for example, page 17, lines 16-21 and page 19, lines 5-8).

Applicants also note that, notwithstanding any claim amendments herein or later during prosecution, Applicants' intent is to encompass equivalents of all claim elements.

I. THE CLAIMED INVENTION

The claimed invention is directed to a magnetic bearing controller including a processor that controls a magnetic bearing using a magnetic bearing drive signal and a counter that accumulates and counts an actual work time of a managed component based upon the magnetic bearing drive signal. The processor also compares the accumulated actual

work time with a preset maintenance time.

Conventional magnetic bearing control devices include a digital signal processor (DSP) that controls the magnetic bearing and also determines when the bearing has malfunctioned (page 1, line 22 - page 2, line 11). However, the magnetic bearings include components with a relatively short service life and, since there is no accumulation of operation time, maintenance times cannot be anticipated prior to a malfunction of these components.

By contrast, the present invention provides a magnetic bearing controller with a processor that not only controls the magnetic bearing but also compares the accumulated actual work time with a preset maintenance time. In this manner, the present invention enables maintenance procedures to be anticipated which in turn can reduce down-time and costs associated with that down-time.

Additionally, since the processor performs both the functions of controlling the bearing and performing the comparison additional components are not required merely for the purpose of performing any comparison.

Further, since the same processor performs not only the function of comparing the actual work time, but also controls the magnetic bearing using a magnetic bearing drive signal, the processor may determine the actual work time based upon the magnetic bearing drive signal, rather than upon power being applied to the processor/controller.

In this manner, the actual work time is based upon the time of operation of the magnetic bearing which is much more closely related to the actual time of operation, rather than upon the time when the controller receives power which might include time in which the magnetic bearing is not receiving a magnetic bearing drive signal and, therefore, the magnetic

bearing is not operating.

II. THE PRIOR ART

A. The Oshima et al. reference in view of the Bazarnik reference

Even assuming arguendo that one of ordinary skill in the art would have been motivated to combine these references, the combination would not teach or suggest each and every element of the claimed invention.

Neither of these references teaches or suggests an actual work time that is based upon a magnetic bearing drive signal. As explained above, this feature is important for more accurately relating maintenance times to the actual operation of the magnetic bearing as opposed to merely basing the actual work time upon the time that the controller receives power.

In stark contrast to the present invention, the Oshima et al. reference discloses a magnetic bearing controller which only serves to compare a command current with an output limit for an amplifier and when that command current exceeds the output limit for a predetermined period of time, the controller shuts down the magnetic bearing. The Oshima et al. reference does not teach or suggest an actual work time that is based upon a magnetic bearing drive signal.

The Bazarnik reference does not remedy the deficiencies of the Oshima et al. reference. Rather, the Bazarnik reference merely discloses a running time sensor that determines a running time that is based upon power being applied to the controller. “A running time sensor means operatively connected to an actuator, e.g. an ignition switch of the equipment being maintained, is employed for detecting the running time of the equipment

each time the latter is operated.” (Col. 3, lines 58-61). “The actuation of the actuator 14, i.e. the closing of the ignition switch, starts the time period in which the equipment is operated.” (Col. 5, lines 48-50).

In the exemplary embodiment that is illustrated in Figure 2 of the Bazarnik reference, the service module 10 detects the application of power by the actuation of one of the actuation switches 106, 108, or 110 by sensing a power current that passes through corresponding buffer diodes D10, D11, or D12, respectively. (Col. 6, line 61 - col. 7, line 6). Each of the drive motor, 100, lift motor 102, and auxiliary motor 104 includes its own controller that provides corresponding drive signals to control the corresponding motor. Thus, the service module 10 merely detects the application of power to a motor controller and does not detect the amount of time that a controller applies a drive signal to drive the motor.

Therefore, in stark contrast to the present invention, the Bazarnik reference does not teach or suggest an actual work time that is based upon a magnetic bearing drive signal.

B. The Oshima et al. reference in view of the Bazarnik reference in further view of the Nakaura reference

As explained in the Amendment filed on February 23, 2004, Applicants submit that these references would not have been combined as alleged by the Examiner.

Even assuming arguendo that one of ordinary skill in the art would have been motivated to combine these references, the combination would not teach or suggest each and every element of the claimed invention.

None of the applied references teaches or suggests an actual work time that is based upon a magnetic bearing drive signal. As explained above, this feature is important for more

accurately relating maintenance times to the actual operation of the magnetic bearing as opposed to merely basing the actual work time upon the time that the controller receives power.

As explained above, neither of the Oshima et al. reference and the Bazarnik reference teaches or suggests an actual work time that is based upon a magnetic bearing drive signal.

The Nakaura reference does not remedy this deficiency.

Rather, the Nakaura reference discloses a magnetic bearing controller which only serves to measure battery voltage and prohibit driving when that battery voltage is in a poor condition. Indeed, the Nakaura reference does not teach or suggest an accumulated actual work time, let alone an actual work time that is based upon a magnetic bearing drive signal.

C. The Oshima et al. reference in view of the Bazarnik reference in further view of the Yokoe et al. reference

As explained in the Amendment filed on February 23, 2004, Applicants submit that these references would not have been combined as alleged by the Examiner.

Even assuming arguendo that one of ordinary skill in the art would have been motivated to combine these references, the combination would not teach or suggest each and every element of the claimed invention.

None of the applied references teaches or suggests an actual work time that is based upon a magnetic bearing drive signal. As explained above, this feature is important for more accurately relating maintenance times to the actual operation of the magnetic bearing as opposed to merely basing the actual work time upon the time that the controller receives power.

As explained above, neither of the Oshima et al. reference and the Bazarnik reference teaches or suggests an actual work time that is based upon a magnetic bearing drive signal.

The Yokoe et al. reference does not remedy this deficiency.

Rather, the Yokoe et al. reference discloses preventing torque variation in a digitally controlled servomotor. Indeed, the Yokoe et al. reference does not teach or suggest an accumulated actual work time or a magnetic bearing controller, let alone an actual work time that is based upon a magnetic bearing drive signal.

D. The Oshima et al. reference in view of the Bazarnik reference in further view of the Yamada et al. reference

As explained in the Amendment filed on February 23, 2004, Applicants submit that these references would not have been combined as alleged by the Examiner.

Even assuming arguendo that one of ordinary skill in the art would have been motivated to combine these references, the combination would not teach or suggest each and every element of the claimed invention.

None of the applied references teaches or suggests an actual work time that is based upon a magnetic bearing drive signal. As explained above, this feature is important for more accurately relating maintenance times to the actual operation of the magnetic bearing as opposed to merely basing the actual work time upon the time that the controller receives power.

As explained above, neither of the Oshima et al. reference and the Bazarnik reference teaches or suggests an actual work time that is based upon a magnetic bearing drive signal.

The Yamada et al. reference does not remedy this deficiency.

Rather, the Yamada et al. reference discloses addressing the issues experienced by operators suffering from physical problems while monitoring a visual data terminal, such as eye fatigue, stiff shoulders and head aches by implementing a rest state when a preset operation time passes. Indeed, the Yamada et al. reference does not teach or suggest an accumulated actual work time or a magnetic bearing controller, let alone an actual work time that is based upon a magnetic bearing drive signal.

III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing amendments and remarks, Applicants respectfully submit that claims 1-19, all the claims presently pending in the Application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the Application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

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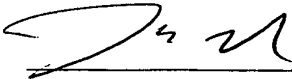
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DOCKET NO. K06-135818M/TBS

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date: 3/23/04


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